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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/544,095	08/01/2005	Edgar Schmidhammer	14219-088MS1 P2003,0070 U	7769
26161 7590 09/28/2007 FISH & RICHARDSON PC P.O. BOX 1022 MINNEAPOLIS, MN 55440-1022			EXAMINER SUMMONS, BARBARA	
			ART UNIT	PAPER NUMBER
			2817	
			MAIL DATE	DELIVERY MODE
			09/28/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/544,095

Applicant(s)

SCHMIDHAMMER ET AL.

Examiner

Barbara Summons

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 01 August 2005 (pre-amendment).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 August 2005 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- ☒ Notice of References Cited (PTO-892)
- ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- ☒ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date 8/1/05.
- ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- ☐ Notice of Informal Patent Application
- ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 1, 3, 7 and 9 are objected to because of the following informalities:

In claim 1, on lines 9-10 thereof, note that "the output terminal" should be changed to - - the first output terminal - - (see line 7).

In claim 1, on line 18 thereof, "configured connect" should be - - configured to connect - -.

In claim 3, on line 3, since first and second band-pass filters have already been recited, now reciting "a band-pass filter" could be confusing as to if this is another band-pass filter other than those already recited. Therefore, the Examiner suggests changing claim 3, line 3 to: - - between the band-pass filter thereof and the corresponding output terminal - -.

In claim 7, on line 2, "at least on" should be - - at least one - -.

In claim 9, on line 3, note that "downstream" should correctly be - - upstream - - since power amplifiers V22 and V12 (see Applicants' Fig. 4) appear in transmitting branches where the propagation direction of the signal is from the corresponding input terminal TX1,2in toward the power amplifiers and then to the appropriate duplexer D1,2.

Appropriate correction is required.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. § 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

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3. Claims 12, 14 and 15 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 12 recites that an LNA (low noise amplifier) is disposed subsequent to a power amplifier in the transmission path, which is totally unclear because low noise amplifiers V11 and V21 (see Applicants' Fig. 4) only appear in receiving paths.

Claim 14 recites that a first LNA is between the first duplexer and the first band-pass filter, which is unclear because the first duplexer and first band-pass filter are in a transmission path (see claim 13, lines 5-8), wherein LNAs are only placed in receiving paths as discussed above. Power amplifiers are placed in transmission paths.

Claim 14 further recites a second LNA between the first duplexer and the third band-pass filter, which is unclear because the third band-pass filter is connected to the second duplexer (see claim 13, lines 13-16) not the first duplexer. The third band-pass filter is also in a transmission path (ibid.) that is inappropriate for the use of LNAs.

Claim 15 recites a third LNA between the first duplexer and the second band-pass filter, which is unclear due to the unclear nature of claim 14, but would be appropriate if "third" were changed to - - first - -, since the first two LNAs of claim 14 cannot exist where claimed, and there can only be two LNAs and two power amplifiers.

Claim 15 also recites a fourth LNA between the first duplexer and the fourth band-pass filter, which is unclear because the fourth band pass filter is connected to the second duplexer (see claim 13, the last two lines thereof) and not the first duplexer.

In any rejections that follow, the claims will be interpreted as Applicants' Fig. 4.

Claim Rejections - 35 USC § 102

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. § 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1, 5, 10 and 11 are rejected under 35 U.S.C. § 102(b) as being anticipated by Ella EP 0 880 227 (cited by Applicants).

Regarding claim 1, Fig. 16 of Ella discloses a circuit configured for use with mobile wireless systems with different frequency bands, the circuit comprising: an antenna connection A1'; a first signal path electrically connected to the antenna connection and having an assigned first frequency band, a first output terminal 79 that is configured to connect to at least one secondary stage circuit RX/AMP3, and a first band-pass filter RX1' between the antenna connection and the first output terminal 79, the first band-pass filter comprising thin layer resonators (see Figs. 18 and 1-8a); and a second signal path electrically connected to the antenna connection and in parallel with the first signal path, the second signal path having an assigned second frequency band that is different from the first frequency band (see page 27, lines 25-29), the second

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signal path comprising a second output terminal 79' configured to connect to at least one secondary stage circuit RX/AMP4, a second band-pass filter RX2' between the antenna connection and the second output terminal, the second band-pass filter also comprising thin layer resonators.

Regarding claims 5 and 11, each of the band-pass filters RX1' and RX2' includes a stacked resonator filter 4 (see e.g. Figs. 18a,b and 5a-8a) that include stacked upper and lower resonators that are acoustically coupled by their direct contact at their shared electrode 26', thereby forming a compound resonator filter. Regarding claim 10, the filters may be configured to conduct a symmetrical signal, as shown by the filters in Figs. 9h and 12.

6. Claims 1-3, 6 and 10 are rejected under 35 U.S.C. §§ 102(a) and 102(e) as being anticipated by Tikka et al. U.S. 2003/0060170.

Regarding claim 1, Fig. 6 of Tikka et al. discloses a circuit configured for use with mobile wireless systems with different frequency bands, the circuit comprising: an antenna connection 120'; a first signal path electrically connected to the antenna connection and having a first frequency band for reception (see section [0038]), the first signal path thus comprising a first output terminal 110' configured to connect to at least one secondary stage 52 (see Fig. 4), and a first band-pass filter 10 between the antenna connection 120' and the first output terminal 110', the first band-pass filter comprising thin layer resonators (see e.g. section [0056]); and a similar second signal path electrically connected to the antenna connection 120' and in parallel with the first signal path, the second signal path having an assigned second frequency band for

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reception that is different from the first frequency band (see section [0038]), the second signal path comprising a second output terminal 130' configured to connect to at least one secondary stage 54 (Fig. 4), and a second band-pass filter 10' between the antenna connection 120' and the output terminal 130', the second band-pass filter also comprising thin layer resonators (section [0056]).

Regarding claim 2, see any of baluns 70, 72 and 74. Regarding claim 3, see baluns 72 and 74. Regarding claim 6, the lattice filters provide selectivity higher than that of a ladder filter, which is about 25 dB (see section [0004]). Regarding claim 10, the lattice filters are configured to conduct a symmetrical signal.

7. Claims 13-15 are rejected under 35 U.S.C. § 102(b) as being anticipated by Matero et al. U.S. 6,125,266.

Fig. 3 of Matero et al., which shows the receiving section in Fig. 3A and the transmitting section in Fig. 3B, discloses circuitry comprising: an antenna 2G; a first duplexer 58 and a second duplexer 60 each connected to the antenna; a first signal path comprising a first transmission path and a first reception path, wherein the first transmission path includes a first input terminal being the input of filter 48 which is connected to the other transmission elements (e.g. mixer 46, etc.), and a first band-pass filter 48 between the first duplexer 58 and the first input terminal, and a first power amplifier 52 between the first duplexer 58 and the first band-pass filter 48, and wherein the first reception path includes a first output terminal being the output of filter 7 which is connected to the subsequent receiving elements (e.g. mixer 9, etc.), and a second band-pass filter 7 between the first duplexer 58 and the first output terminal, and a first

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low noise amplifier 5 between the first duplexer 58 and the second band-pass filter 7; a second signal path comprising a second transmission path and a second reception path, wherein the second transmission path includes a second input terminal being the input to filter 50 connected to the other transmission elements (mixer 46, etc.), and a third band-pass filter 50 connected between the second duplexer 60 and the second input terminal, and a second power amplifier 54 connected between the second duplexer 60 and the third band-pass filter 50; and wherein the second reception path includes a second output terminal being the output of filter 8 connected to subsequent receiving elements (mixer 9, etc.), and a fourth band-pass filter 8 connected between the second duplexer 60 and the second output terminal, and a second low noise amplifier 6 connected between the second duplexer 60 and the fourth band-pass filter 8. That is, Fig. 3 (3A and 3B) of Matero has a front-end circuit between the antenna and TX/RX circuitry (i.e. starting at mixers 9 and 46) that has the same features as Applicants' Fig. 4.

8. Claims 13-15 are rejected under 35 U.S.C. § 102(e) as being anticipated by Atarius et al. U.S. 6,920,324.

As in the immediately preceding rejection, Fig. 8 of Atarius et al. shows circuitry that is similar to Applicants' Fig. 4, comprising: an antenna; a first duplexer 58 and a second duplexer 56; a first transmission path including a power amplifier 108 between the first duplexer 58 and a first band-pass filter 282, the input thereof being the first input terminal; a first reception path including a LNA 64 between the first duplexer 58 and a second band-pass filter 254, the output thereof being the first output terminal; a

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second transmission path including a power amplifier 116 between the second duplexer 56 and a third band-pass filter 276, the input thereof being the second input terminal; and a second reception path including a LNA 78 between the second duplexer 56 and a fourth band-pass filter 264, the output of which is the second output terminal.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. § 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

10. Claim 6 is rejected under 35 U.S.C. § 102(b) as anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Ella EP 0 880 227 (cited by Applicants).

Ella discloses that its circuit is formed so that the selectivity between the filters is at a "high level" (see page 27, lines 40-42), wherein a "high level" of selectivity, if not

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inherently including the "at least about 20 dB" as claimed, is alternatively considered to obviously include "at least about 20 dB", which would have been a known design criteria of selectivity in the frequency separation/duplexer filter art, especially in view of the fact that Ella discloses a "high level" of selectivity as 45 dB for the TX and RX filters in the Fig. 15 duplexer (see page 26, lines 1-2), and as also evidenced by other art of record (see e.g. Tikka et al. applied above).

11. Claims 1-6, 10 and 11 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Ella et al. U.S. 6,670,866 in view of Tikka et al. U.S. 2003/0060170.

In order to avoid repetition note that Ella Fig. 11 is substantially similar to Tikka et al. Fig. 6. As such, Ella Fig. 11 also shows two signal paths each signal path having a different frequency band and being connected between an antenna connection 200 and output terminals 210 and 230, each signal path also including a band-pass filter 150, 150' formed of thin layer resonators and a balun 10, 10' that is in at least one of the signal paths. Regarding claim 3, see e.g. Fig. 13 where a balun 10' is between the filter 250 and the corresponding output terminal 230. Regarding claims 4, 5 and 11, the balun itself can also be configured to be the filter itself (see Figs. 16a-18) or part of the filter (see also Fig. 14), and it includes two resonators stacked and acoustically coupled to form a compound resonator (see Fig. 14 as well as Figs. 5-7, wherein Fig. 5 shows the acoustic coupling).

However, Ella discloses that one of the filters is a transmitting filter, and as such has an input terminal 230 rather than a second output terminal per se.

Tikka discloses, and it would have been routine in the art, to convert such transmitting and receiving filter paths to be either both receiving paths, or for that matter, both transmitting paths (see Tikka at sections [0038]-[0040] and [0057]).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the circuit of Ella by having provided that both of the signal paths would have been for receiving, because such an obvious modification would have been routine in the art, and merely dependent upon the intended use of the circuit, as would have been known by those of ordinary skill, and as evidenced by the explicit suggestion of such a modification by Tikka (*ibid.*).

12. Claims 1, 7-9 and 12 are rejected under 35 U.S.C. § 103(a) as being unpatentable over either one of Matero et al. U.S. 6,125,266 or Atarius et al. U.S. 6,920,324 in view of Hasler U.S. 6,351,236.

Each of Matero and Atarius discloses the invention as discussed above.

However Matero does not specifically disclose the two band-pass filters (7 and 8 in Fig. 3A) in the receive paths (i.e. having the first and second output terminals) comprising thin layer resonators as required by claim 1 (see lines 9-10 and 22-24). Similarly, Atarius does not specifically disclose its two receiving band-pass filters 254 and 264 (see Fig. 8) comprising thin layer resonators. Each of Matero and Atarius is silent as to the specific type of band-pass filter used in its circuit.

Hasler discloses that it would have been known to have provided the band select filter 8 (see Fig. 2 and col. 3, lines 55-61) as a thin film resonator filter (see e.g. claim 2).

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Note that the filter 8 of Hasler (Fig. 2) is analogous to the filters of Matero and Atarius since it is in the same location downstream from a duplexer and a LNA.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the circuitry of either one of Matero (Figs. 3, 3A and 3B) or Atarius (Fig. 8), if even necessary, by having provided that the receiving band select filters (7 and 8 of Matero Fig. 3A/ or 254 and 164 of Atarius Fig. 8) comprise thin film resonators, because each of Matero and Atarius is silent as to the specific type of band-pass filters used, thereby suggesting to one of ordinary skill in the art that any well known type of band-pass filter, such as the thin film resonator filter suggested by Hasler (see claim 2 and col. 3, lines 55-61 and element 8 in Fig. 2) would have been usable therewith, and because if the original filters of Matero and Atarius were not already thin film resonator filters, such a modification as switching to a thin film resonator filter would have been the mere substitution of art recognized alternative band-pass filters as suggested by Hasler (see claim 2 which lists multiple types of filters), and as would have been known by one of ordinary skill in the wireless communication systems art, wherein thin film resonator filters would have also been well known by those of ordinary skill to provide the advantage of miniaturization over other types of filters.

Conclusion

13. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

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Takamine U.S. 6,873,227 discloses (Fig. 14) that it is known to use filters 164 and 168 with balun functions in communications systems also having a duplexer 162 and LNA 165 and power amplifier 167.

Bradley et al. U.S. 7,126,440 shows (Fig. 4) a circuit similar to Applicants' Fig. 4 having duplexers 16 that comprise thin film resonators (see col. 4, lines 10-13). However, its earliest effective filing date does not precede Applicants'.

Schmidhammer et al. U.S. 7,102,460 shares common inventors with the instant application and discloses thin film resonator filters with balun functions and including stacked acoustically coupled compound resonators (see e.g. Figs. 7A and 7B).

Hagstrom et al. U.S. 6,185,434 discloses that in multi-band communication systems it is known that switches and duplexers are interchangeable (see e.g. Fig. 2 vs. Fig. 3).

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Barbara Summons whose telephone number is (571) 272-1771. The examiner can normally be reached on M-Th, M-Fr.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Bob Pascal can be reached on (571) 271-1769. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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September 25, 2007


BARBARA SUMMONS
PRIMARY EXAMINER